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An Evaluation of the Extended Sirloin Cap Coulotte

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Summary

Fabrication methods for the beef carcass are strongly based on tradition. Extended sirloin caps were removed with a knife prior to round/sirloin fabrication. Steaks from the cap were cut parallel or perpendicular to muscle fiber direction. Steaks, regardless of cutting style, were more tender, juicier, and had less connective tissue towards the anterior of the cap. Lower shear force values also occurred at the anterior tip. Steaks cut parallel to muscle fiber direction had lower shear force values compared to perpendicular cut steaks.

Introduction

Under normal U.S. beef carcass fabrication methods, the point of round-sirloin separation results in a portion of the *Biceps femoris* (BF) remaining on the sirloin. Tenderness mapping (2011 *Nebraska Beef Cattle Report*, pp. 105-107) has shown that the two most proximal BF steaks are the most tender region of the muscle

in the round. Warner Bratzler Shear Force values have indicated these steaks are tender and thus could be potentially marketed as premium to other round steaks. To evaluate the feasibility of an extended sirloin cap, the objectives of this study were to determine the point of round/sirloin separation to produce an extended sirloin cap and to evaluate different steak fabrication styles, both parallel and perpendicular to muscle fiber orientation.

Procedure

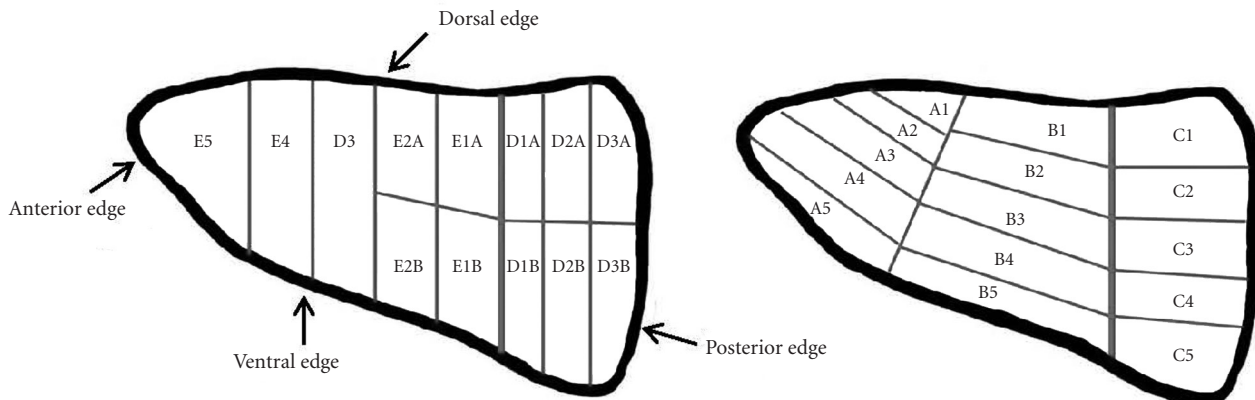
The right side of 20 USDA Choice, YG 3 beef carcasses weighing 800-850 lb were selected. The *Biceps femoris* was removed using the aitch bone (pelvic bone) as an anatomical landmark. The cut was made at the proximal end of the semitendinosus, perpendicular to the long axis of the *Biceps femoris*. The extended sirloin cap from each carcass was weighed whole both untrimmed and trimmed, and length, width, and height (cm) of the cap was measured. The extended sirloin caps were vacuum packaged and transported to the University of Nebraska–Lincoln Loeffel Meat Laboratory under refrigeration and were aged for 25 d at 39°F prior to steak fabrication.

To evaluate steak cutting method,

and its effect on tenderness in the extended sirloin cap, two steak fabrication styles were utilized: parallel ($n = 10$) and perpendicular ($n = 10$) to muscle fiber direction (Figure 1). These fabrication styles were conceived after mapping the fiber direction of the extended sirloin cap (Figure 1). All steaks were cut 1 in thick. In both cutting methods a divisional cut was made from dorsal to ventral edge approximately 3 in anterior from the posterior cut surface. This divisional cut was marked by a fat seam on the dorsal side, as well as the end to a slight bulge in the BF.

Steaks from 10 extended sirloin caps, five from each steak fabrication method, were subject to WBS evaluation. Steaks were grilled on Hamilton Beach Indoor/Outdoor grills to an internal temperature of 170°F. Steaks were placed on a tray and covered with oxygen-permeable film and placed in a 39°F cooler. Twenty hours later, ½" cores were taken from the cooked steaks and sheared using a tabletop WBS machine. Results were recorded for each core sheared.

Steaks from ten extended sirloin caps, five from each steak fabrication method, were subject to sensory panel evaluation. Steaks were cooked on a Hamilton Beach Indoor/Outdoor grills to an internal temperature of



Top left: Location and designation of steaks fabricated parallel to muscle fiber direction.

Top right: Location and designation of steaks fabricated perpendicular to muscle fiber direction.

Figure 1. Steak fabrication methods for extended sirloin caps.

Table 1. Sensory attributes and connective tissue of steaks fabricated parallel to muscle fiber direction.

Steak	Sensory Attribute ¹				WBS
	Juiciness	Tenderness	Connective Tissue	Off-flavor	
E5	5.74 ^{ab}	6.71 ^{ab}	6.49 ^a	3.37	6.23 ^{cd}
E4	5.89 ^a	6.79 ^a	6.35 ^{ab}	3.24	7.59 ^{cd}
E3	5.51 ^{ab}	6.26 ^{ab}	6.22 ^{ab}	3.32	7.24 ^{cd}
E2A	5.59 ^{ab}	6.15 ^{bc}	5.76 ^{abc}	3.44	7.57 ^{cd}
E2B	4.71 ^{de}	5.32 ^e	4.81 ^{de}	3.20	6.05 ^d
E1A	5.73 ^{ab}	6.01 ^{cd}	5.70 ^{bc}	3.27	10.63 ^{ab}
E1B	5.25 ^{bc}	5.27 ^e	4.43 ^{ef}	3.32	6.29 ^{cd}
D1A	5.23 ^{bc}	5.97 ^{cd}	5.76 ^{abc}	3.21	11.35 ^{ab}
D1B	4.73 ^{de}	5.38 ^e	4.75 ^{def}	3.39	7.39 ^{cd}
D2A	4.82 ^{cde}	5.53 ^{de}	5.27 ^{cd}	3.45	10.32 ^{ab}
D2B	5.21 ^{bcd}	4.71 ^f	4.23 ^f	3.32	9.06 ^{bc}
D3A	5.55 ^{ab}	5.97 ^{cd}	5.31 ^{cd}	3.26	12.19 ^a
D3B	4.61 ^e	5.34 ^e	4.91 ^{de}	3.15	12.03 ^a
P-value	<0.001	<0.001	<0.001	0.98	<0.0001
SEM	0.29	0.33	0.39	0.54	0.64

a, b, c, d, e, f, g, h Means in the same row having different superscripts are significant at $P < 0.05$.

¹Sensory attributes rated by a trained sensory panel on tenderness (8 = extremely tender; 1 = extremely tough), juiciness (8 = extremely juicy; 1 = extremely dry), connective tissue (8 = no connective tissue; 1 = abundant amount) and off-flavor (8 = strong off-flavor; 1 = no off-flavor).

Table 2. Sensory attributes, connective tissue, and WBS results of steaks fabricated perpendicular to muscle fiber direction.

Steak	Sensory Attribute ¹				WBS
	Juiciness	Tenderness	Connective Tissue	Off-flavor	
A1	5.80 ^a	6.67 ^a	6.54 ^a	3.35 ^{ab}	5.21 ^f
A2	5.25 ^{ab}	6.41 ^{ab}	6.15 ^{abc}	3.13 ^b	6.05 ^f
A3	5.08 ^{bcd}	6.21 ^{abc}	6.22 ^{ab}	3.13 ^b	6.58 ^{ef}
A4	5.06 ^{bcd}	6.06 ^{bcd}	5.58 ^{cd}	3.10 ^b	6.71 ^{ef}
A5	4.84 ^{bcd}	5.42 ^{def}	4.74 ^{efg}	3.78 ^a	7.99 ^{def}
B1	4.80 ^{bcd}	6.41 ^{ab}	6.18 ^{abc}	3.12 ^b	5.63 ^f
B2	5.03 ^{bcd}	5.32 ^{ef}	4.76 ^{ef}	3.08 ^b	7.44 ^{def}
B3	4.90 ^{bcd}	5.70 ^{cde}	5.22 ^{de}	3.30 ^{ab}	8.07 ^{def}
B4	4.73 ^{bcd}	4.95 ^{fg}	4.68 ^{efg}	3.10 ^b	10.10 ^{de}
B5	5.20 ^{abc}	4.78 ^{fg}	4.00 ^{gh}	3.28 ^b	9.86 ^{de}
C1	4.62 ^{cd}	5.99 ^{bcd}	5.59 ^{bcd}	3.31 ^{ab}	8.12 ^{def}
C2	4.90 ^{bcd}	5.76 ^{cde}	5.23 ^{de}	3.00 ^b	11.09 ^d
C3	4.86 ^{bcd}	5.15 ^f	4.28 ^{fgh}	3.26 ^b	14.63 ^{bc}
C4	4.58 ^d	4.54 ^{gh}	3.74 ^h	3.30 ^{ab}	16.85 ^b
C5	4.75 ^{bcd}	4.02 ^h	2.76 ⁱ	3.32 ^{ab}	21.21 ^a
P-value	0.0278	<0.001	<0.001	0.42	<0.0001
SEM	0.41	0.37	0.44	0.28	0.66

a,b,c,d,e,f,g,h,i Means in the same row having different superscripts are significant at $P < 0.05$.

¹Sensory attributes rated by a trained sensory panel on tenderness (8 = extremely tender; 1 = extremely tough), juiciness (8 = extremely juicy; 1 = extremely dry), connective tissue (8 = no connective tissue; 1 = abundant amount) and off-flavor (8 = strong off-flavor; 1 = no off-flavor).

170°F; after being flipped once at 85°F. Cooked steaks were cut into ½" individual cubes and kept warm in a pre-heated countertop warmer. The steaks were served to five trained panelists that evaluated at most seven samples per session. Each sample was evaluated for tenderness (8 = extremely tender; 1 = extremely tough), juiciness (8 = extremely juicy; 1 = extremely dry), connective tissue (8 = no connective tissue; 1 = abundant amount) and off-flavor (8 = strong off-flavor; 1 = no off-flavor).

Results and Discussion

Differences existed within extended sirloin caps regardless of cutting style, for tenderness, juiciness, connective tissue, and WBS results. Steaks fabricated parallel to muscle fiber direction had lower overall WBS values when compared to steaks fabricated perpendicular to muscle fiber direction. Steak C5, the most dorsal and posterior steak, had the highest ($P < 0.05$) WBS value.

Steaks fabricated parallel to muscle fiber direction were rated more tender ($P < 0.001$) towards the anterior of the cap (Table 1) when compared to all other steaks. These steaks were also more juicy and had less connective tissue. Steaks from locations E (E2 and E1) and D (D1 – D3) that had been fabricated into dorsal and ventral halves had a tendency for steaks on the dorsal side to be less tender, less juicy, and greater amounts of connective tissue ($P < 0.001$).

Steaks fabricated perpendicular to muscle fiber direction had more desirable traits towards the anterior portion of the extended cap (Table 2). Steaks from location A were juicier, more tender, and had less connective tissue when compared to steak locations B and C ($P < 0.0001$). Steaks from location B and C were rated similar and intermediate for juiciness. Steaks from location B and C on the dorsal edge of the cap (steaks 4-5) were less tender and had significantly ($P < 0.05$) more connective tissue when compared to steaks from the ventral side of the cap (steaks 1-3). These results parallel those found when analyzing sensory data based on apparent region within the extended cap.

After assessing the sensory panel data and WBS an extended sirloin cap possibly could be excised from the carcass prior to fabrication of the sirloin/round. With lower WBS results and higher sensory panel ratings anterior to the divisional cut used in this study, it is recommended to produce a cap cut anterior from this point. To do so, the same anatomical landmarks for extended sirloin cap can be utilized — dorsal tip of the aitch bone to the lateral side of the carcass — but an adjustment of 3 inches anterior from that line is recommended. Steaks should be fabricated perpendicular to muscle fiber direction to maintain tenderness in this alternative cut.

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